

## Appendix A

### **Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management for Montana and the Dakotas**

#### **Standards**

**Dakotas STANDARD #1: Uplands are in proper functioning condition for site specific conditions of climate, soils and parent material.**

- As indicated by:

##### Physical Environment

- erosional flow patterns;
- surface litter;
- soil movement by wind and water;
- infiltration;
- soil crusting and surface sealing;
- rills;
- gullies;
- cover amount; and
- cover distribution.

##### Biotic Environment

- community diversity;
- community structure;
- exotic plants;
- photosynthesis activity;
- plant status;
- seed production;
- recruitment; and
- nutrient cycle.

- Background Information

No single factor or characteristic of an upland site can provide a complete picture of either that site's condition or the direction of its successional change. Things considered "negative" in traditional evaluations of ecological sites may or may not be such for upland sites.

Rangeland health should be based on the evaluation of several criteria including, at a minimum, degree of soil stability and watershed function, nutrient cycles and energy flows, and available recovery mechanisms.

Indicators to assess soil stability and watershed function relate to two fundamental processes of watershed degradation: soil erosion by wind and water; and infiltration of precipitation and runoff.

Indicators such as rills, gullies, flow patterns, pedestaling and compaction may be used to assess watershed condition.

Indicators that can be used to evaluate nutrient cycles and energy flows relate to distribution of plants, litter, roots, and photosynthetic period.

Recovery mechanisms or plant demographic indicators may include increasing vegetative cover, plant vigor, kind and number of seedlings, and changes in plant age distribution.

Physical features of a proper functioning watershed are indicated by:

- little evidence of soil erosion by wind and/or water as indicated by the significant absence of rills, gullies, and pedestals;
- surface sealing and soil crusting is not evident; and
- plant (ground) cover and litter accumulation is adequate to protect site.

Soils are stable and provide for capture, storage, and release of water appropriate to soil type, climate and landform.

Biotic features of a proper functioning watershed are indicated by:

- a sufficient variety and number of plant lifeforms (grass, forb, shrub, tree) occur on the site;
- plants exhibit optimal size, height, distribution, and age/class;
- introduced or exotic plants (weeds) are absent or sparse on site;
- plants are alive, productive with well developed root systems;
- plant reproduction is adequate for stand maintenance of all lifeforms;
- litter distribution is uniform across site; and
- nutrient/energy cycle mechanisms are adequate for plant maintenance.

## **Dakotas STANDARD #2: Riparian areas and wetlands are in proper functioning condition for site specific conditions of climate, soils and parent material.**

- As indicated by the presence or absence of:

### Hydrologic

- flood plain inundated in relatively frequent events;
- altered streambanks;
- upland watershed not contributing to riparian degradation; and
- stream channel morphology (including but not limited to gradient, width/depth ratio, channel roughness and sinuosity) and functions are appropriate for the climate and landform.

### Erosion Deposition

- flood plain and channel characteristics; i.e., rocks, coarse and/or woody debris adequate to dissipate energy;
- lateral stream movement is associated with natural sinuosity;
- system is vertically stable;
- stream is in balance with water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition); and
- bare ground.

### Vegetation

- healthy, productive and diverse populations of native species are being maintained;
- condition of trees and shrubs;
- riparian plants exhibit high vigor; and
- adequate vegetative cover present to protect banks and dissipate energy during high flows.

- Background Information

No single factor or characteristic of a riparian site can provide a complete picture of either that site's condition or the direction of its successional change. Things considered negative in traditional evaluations of ecological sites may not be such for riparian sites. For example, the percent of exposed soil surface, which often reflects overgrazing or erosion on upland sites, may be a result of normal riparian activity, sediment deposition resulting after spring runoff, or a high water event.

Broadly, proper functioning condition may be defined as the ability of a stream to perform its riparian functions. These functions include sediment filtering, bank building, water storage, aquifer recharge, and hydrologic energy dissipation.

- Hydrology\Streambanks

The hydrology of a riparian area is perhaps its most important characteristic. Changes in hydrology may result in short- and long-term vegetative changes. In some situations, construction (riprap, roads, railroads, etc.) has influenced the streambanks and stability has been increased over the natural levels. These streambanks may eventually lose their stability, and become altered. This generally occurs if the problems which caused the weak streambanks have not been remedied. Also, constructed streambanks (especially those with riprap) will often disrupt the normal energy dissipation of the stream and eventually the meandering of a stream can result in the erosion of streambanks downstream.

- Lateral Cutting is indicated by new stream-caused bank disruption along the outside of stream curves, and much less common, along the straight portions of a stream. A high degree of active lateral cutting can indicate a degraded watershed.

- Altered Streambanks, in many instances, land uses have degraded streambanks, accelerating stream movement across the flood plain. We define altered streambanks as those having impaired structural integrity (strength or stability) due to activities which expose soil surfaces as a result from hiking, ATV, livestock and wildlife trails, roads, logging skid trails, mining activities, etc.

- Deep Binding Root Mass, properly functioning streambanks are protected by both vegetation and bank rock materials (e.g., boulders and cobbles). There have been few studies documenting the depth and extent of root systems of various plant species. Among riparian herbaceous species, the first rule is that annual plants do not have deep, binding root masses. Perennial species, including trees and shrubs, offer a wide range of root mass qualities and may indicate long term streambank stability.

- Downcutting, active downcutting of a stream is often hard to recognize. Perched wetland vegetation and streambank features, plus the lack of a separate layer of channel bottom materials (i.e., the stream flows directly on the substrate materials), can be clues to downcutting.

- Soils/Geology

The soils and geology (landform and parent material) of a riparian site influence how the site reacts to disturbances and changes over time. Changes in physical characteristics are often more difficult to remedy through management actions than are vegetative changes. The depth and texture of soil of a riparian site influences the capacity of that site to hold water and act as a sponge for prolonged late season flows and support of desired vegetation.

- Bare ground, exposed soil surface is important in evaluating the health of riparian areas for several reasons: 1) vulnerability to erosion; 2) it may contribute to, as well as reflect, streambank deterioration; 3) less vegetation is available for soil protection and sediment entrapment; and 4) exposed soil provides opportunity for introduction of native plant species as well as invasion by noxious weeds and undesirable species.

- Vegetation

Because they are more visible than soil or hydrological characteristics, plants may provide early indications of riparian health.

- Reproduction of Trees and Shrubs, one of the clearest indicators of ecological stability, and subsequent health, is the presence of all age classes (seedling, sapling, pole, mature, decadent, and dead) of tree and shrub species where the potential exists.

- Dead and Decadent Trees and Shrubs, the amount of dead and decadent material in trees and shrubs can be an indicator of the overall "health" of riparian areas. Decadent and dead woody material can indicate severe stress from artificial or natural causes and may be caused by severe winter temperatures, spring freezes, disease, over utilization, or insect infestations.

- Utilization of Trees and Shrubs, heavy utilization by livestock and/or wildlife can prevent the regeneration or establishment of woody species. Excessive use of woody species may cause their elimination from the site and their replacement by disturbance-induced species or undesirable invaders.

- Plant Composition, the presence of disturbance-induced herbaceous plants (either native or introduced) may indicate that the health of the site could be improved or that it is not performing optimal riparian functions. Most of these species provide less soil holding and sediment trapping capability, and less desirable forage for livestock and wildlife.

### **Dakotas STANDARD #3: Water quality meets assigned State water quality standards.**

- As indicated by:
  - dissolved oxygen concentration;
  - pH;
  - turbidity;
  - temperature;
  - fecal coliform;
  - sediment;
  - color;
  - toxins; and
  - others: ammonia, barium, boron, chlorides, chromium, cyanide, endosulfan, lindane, nitrates, phenols, phosphorus, sodium, sulfates, etc.

- Background Information

Natural processes influence the chemical, physical, and biological characteristics of water. When discussing rangeland health, water quality is a relative term which must be associated with water-use to become meaningful. Water quality varies from place to place, with the seasons, the climate, and the kind of rock and soil through which water moves. After reaching the earth, water dissolves minerals from the earth's crust, percolates through organic materials such as roots and leaves, and reacts with living things such as microscopic organisms like plankton and algae. Water quality is changed by stream sediments and is modified by temperature, soil bacteria, and evaporation.

Water quality criteria specify concentrations of water constituents which, if not exceeded, are expected to support an aquatic ecosystem suitable for higher uses of water. Water quality criteria are intended to protect the direct uses of water, essential and significant life in water, and life that is dependent on life in water for its existence.

Some of the common indicators of water quality are:

- Dissolved oxygen concentration (DO), which is a function of temperature of the water, altitude and barometric pressure. The ability of water to hold oxygen decreases with the increases in temperature, altitude and dissolved solids.
- pH (hydrogen-ion concentration), which is an indicator of acidity and/or alkalinity and an index of hydrogen ion activity. Lower values indicate acid; higher values indicate alkaline. Fresh water organisms function properly if the pH ranges from 6.0 to 9.0 units. pH concentrations below the recommended level are toxic to fish and other aquatic organisms.
- Turbidity, which is the disturbance of water due to the presence of suspended matter such as clays, silt, organic matter, and various effluents. It is the expression of the optical property of water. Excess turbidity reduces light penetration.
- Temperature, which is an important function which affects aquatic productivity. Temperature changes may result from natural climatic conditions or man's manipulation of the riparian environment. Temperature is a function of location, season, time, duration of flow, depth, and many other variables, which may or may not be affected by human activities.
- Coliform groups, which include bacteria organisms in their natural habitat and sources; i.e., feces, soil, water, vegetation, etc. Coliform organisms may be the result of plant and soil runoff water.
- Sediment, which is a measure of suspended sand, silt, colloid and organic matter which will settle in time to the stream bottom. Sediment originates from sources such as natural erosion, mine waste, plowed fields, construction projects, or vegetative manipulation.

- Color, which is attributed to substances in solution after the suspensoid have been removed. It may be organic or inorganic substances that affect photosynthesis activity in the water. Organic substances include humic materials, peat, aquatic plants, etc. Inorganic sources include iron and manganese compounds, chemicals, industrial waste, etc.

- Toxins, which are those compounds or substances which are found in by-products or waste of various industries or activities that make their way into water sources.

Acceptable water quality is indicated by:

- dissolved oxygen (DO) concentrations which are being maintained at or near saturation levels;
- pH concentrations which are at or near recommended State levels;
- turbidity readings which do not exceed Jackson Turbidity readings for the water source;
- water temperature readings which meet State standards preferred for good growth and productivity;
- coliform levels which do not exceed the State average for the site;
- sediment (suspended solids) which does not exceed the State standard;
- color which does not limit or significantly restrict photosynthesis processes; and
- toxin levels which are in conformance with State standard.

#### **Dakotas STANDARD #4: Air quality meets State air quality standards.**

(Note: The Montana and the Dakotas standards are similar)

PM-10	50 ug/m3 annual avg 150 ug/m3 24-hr avg*
Sulfur Dioxide	0.02 ppm annual avg 0.10 ppm 24-hr avg* 0.50 ppm 1-hr avg**
Carbon Monoxide	23 ppm hourly avg* 9.0 ppm 8-hr avg*
Nitrogen Dioxide	0.05 ppm annual avg 0.30 ppm hourly avg*
Ozone	0.10 ppm hourly avg*
Lead	1.5 ug/m3 90 day avg
Foliar Fluoride	35 ug/g grazing season avg 50 ug/g monthly avg
Settled Particulate Matter (dustfall)	10mg/m2 30-day avg
Hydrogen Sulfide	0.05 ppm hourly avg*
Visibility	particle scattering coefficient of $3 \times 10^{-5}$ per meter annual avg***

\* Not to be exceeded more than once per year.

\*\* Not to be exceeded more than 18 times per year.

\*\*\* Applies to PSD mandatory Class I areas.

The Clean Air Act established the Prevention of Significant Deterioration (PSD) regulations which set limits for increases in ambient pollution levels and established a system for preconstruction review of new major air pollution sources. Three PSD classes have been established: Class I, Class II, and Class III. Class I areas consist of all international parks, national parks greater than 5,000 acres, national wilderness areas greater than 5,000 acres, and national wildlife refuges which existed on August 7, 1977, when the amendment was signed into law.

Protection of air quality is provided to Class I areas by severely limiting the amount of additional human-caused air pollution which can be added. All other areas, except non-attainment areas, are classified as Class II in which a greater amount of additional human-caused pollution may be added. In no case, however, may pollutant concentrations exceed the National or State ambient air quality standards.

### **Dakotas STANDARD #5: Habitats are maintained and/or restored, where appropriate, for healthy, productive and diverse populations of native plant and animal species.**

- As indicated by:
  - plants and animals are diverse, vigorous and reproducing satisfactorily noxious weeds are absent or insignificant in the overall plant community;
  - spatial distribution of species is suitable to ensure reproductive capability these species may include special status species (federally threatened, endangered, candidate or Montana/North Dakota/South Dakota species of special concern);
  - species diversity (including plants, animals, insects and microbes) is present;
  - livestock grazing systems are designed to maintain rangeland health and to ensure a variety of plant communities are present; and
  - connectivity of habitat or presence of corridors to prevent habitat fragmentation.

- Background Information

No single factor or characteristic of a site can provide a complete picture of either that site's condition or the direction of its successional change.

Bureau of Land Management is charged with managing and developing habitat for a large variety of fish, wildlife and special status species of plants. Basic habitat considerations can be categorized as including food, water, cover, and space. Specific habitat requirements often vary depending on what geographic area is being considered, species which are present, and the nature and extent of other uses which may be competing. A review of components of the above listed standards (Proper Functioning Riparian-Wetland areas, Uplands and Water Quality) will provide many of the requirements needed to achieve fish, wildlife, and special status plant habitat.

## **Guidelines**

Guidelines for grazing management are preferred or advisable approaches to grazing management practices determined to be appropriate to ensure that standards can be met or that significant progress can be made toward meeting the standard(s).

Guidelines are provided to maintain or improve resource conditions in upland and riparian habitats available for livestock grazing. In both riparian and upland habitats, these guidelines focus on establishment and maintenance of proper functioning conditions. The application of these guidelines is dependent on individual management objectives. Desired future conditions in plant communities and streambank characteristics will be determined on a site specific basis.

### **Dakotas GUIDELINE #1:**

Grazing will be managed in a manner that will maintain the proper balance between soils, water, and vegetation over time. This balance varies with location and management objectives, but acceptable levels of use can be developed that are compatible with resource objectives.

**Dakotas GUIDELINE #2:**

Manage grazing to maintain or improve watershed vegetation, biodiversity, and flood plain function. Maintain or improve riparian vegetative cover and structure to trap and hold sediments during runoff events to rebuild streambanks, restore/recharge aquifers, and dissipate flood energy. Utilize management practices that promote deep-rooted herbaceous vegetation to enhance streambank stability, and the growth and expansion of woody species to provide wildlife habitat.

**Dakotas GUIDELINE #3:**

Pastures and allotments will be evaluated for sensitivity and suitability for livestock grazing. Unsuitability or potentially unsuitable areas may be excluded from grazing, and/or managed more intensively.

**Dakotas GUIDELINE #4:**

Management strategies for livestock grazing will ensure that long-term resource capabilities can be sustained. Natural and management-induced streambank alteration, and utilization of herbaceous and woody vegetation are critical factors which must be evaluated in any grazing management plan. Acceptable levels of streambank alteration and herbaceous/woody utilization shall be identified on a site specific basis, and used in terms and conditions. Compatible seasons and duration of use, rest periods, stocking rates, structural facilities, and management activities can then be designed to ensure that standards are achieved.

**Dakotas GUIDELINE #5:**

Frequency of grazing and extent of defoliations will be managed to promote desired plants and plant communities, based on the rate and physiological conditions of plant growth. To meet these plant growth considerations, the following may be applied: no grazing unit should be grazed for more than half the growing season of key plant species; periods of use throughout the growing season (early, mid, late) should be alternated from year to year; and pastures should be deferred from grazing at least once every 3 years or until seeds set. The season of use should be alternated from year to year to allow for regeneration of woody and herbaceous species. Rather than using calendar dates, stages of plant growth, length of grazing period, and target utilization levels should be used to determine when livestock should be moved to another grazing unit. Caution should be used to avoid early spring grazing use when soils and streambanks are wet and susceptible to compaction and physical damage that occurs with animal trampling.

**Dakotas GUIDELINE #6:**

The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect the ecological functions and processes of those sites.

**Dakotas GUIDELINE #7**

Locate permanent facilities (e.g., corrals, water developments) away from riparian-wetland areas.

**Dakotas GUIDELINE #8:**

Supplemental salt and minerals should not be placed adjacent to watering locations or in riparian-wetland areas. These should be placed in upland sites to draw livestock away from watering areas, or other sensitive areas, and to contribute to more uniform grazing distribution.

**Dakotas GUIDELINE #9**

For the guidelines of noxious weed management refer to "Guidelines for Coordinated Management of Noxious Weeds in the Greater Yellowstone Area." These guidelines provide a unified effort in developing a public awareness program; a prevention program; and a common inventory, mapping, monitoring, and reporting procedure. An overall management plan and specific action plans can be developed for logical units of land called weed management areas. Guidelines for noxious weed control management must meet or exceed State laws.

**Dakotas GUIDELINE #10:**

Grazing management practices should maintain or promote the interaction of the hydrologic cycle, nutrient cycle and energy flow that will support the appropriate types and amounts of soil organisms, plants, and animals appropriate to soil type, climate and landform.

**Dakotas GUIDELINE #11:**

Livestock grazing practices should be utilized to protect water quality or restore water quality to water bodies not fully supporting designated beneficial uses (e.g., water quality limited streams). Bureau of Land Management management actions or use authorizations do not contribute to pollution that violates the quantitative or narrative North or South Dakota Quality Standards.

**Dakotas GUIDELINE #12:**

Grazing management practices should maintain, improve or restore habitat to assist in the recovery or promote conservation of federally listed threatened, endangered, and sensitive plant and animals.

**Dakotas GUIDELINE #13:**

Grazing management practices should maintain or promote the physical and biological conditions to sustain native populations and communities, and should emphasize native species in support of ecological functions.

**Dakotas GUIDELINE #14:**

Non-native plant species are used only in those situations in which native species are not readily available in sufficient quantities or are incapable of maintaining or achieving properly functioning conditions and biological health.